

SOUTHWEST FISHERIES SCIENCE CENTER
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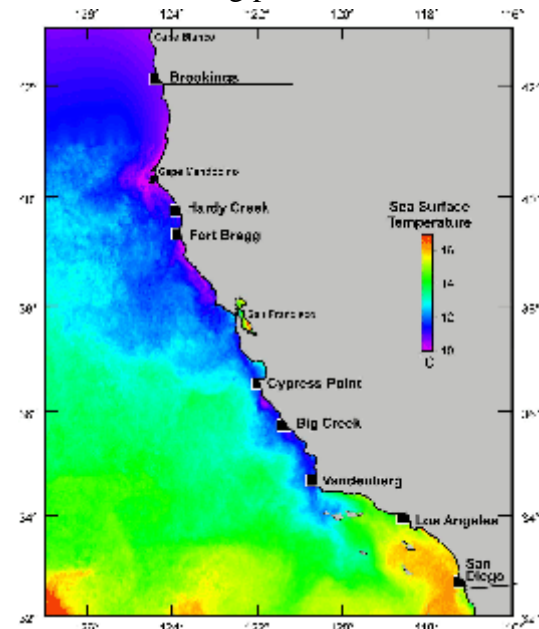
Submitted by: Roger Hewitt, Division Director, Fisheries Resources Division

Title of accomplishment of milestone: Complete manuscript describing estimates of mean coastal dispersal for grass rockfish, with implications for fisheries management.

Current status: Project is finished and manuscript is in press at *Marine Biology*.

Background information: Understanding the magnitude and pattern of dispersal among marine populations is a key element for effective placement of management boundaries and design of marine protected area (MPA) networks (Botsford *et al.* 2003). For species that are highly residential as adults, dispersal at pelagic early life history stages largely determines patterns of population inter-connectivity. For marine fishes with pelagic eggs and larvae, dispersal may be influenced by duration of the planktonic stage (Waples and Rosenblatt 1987; Doherty *et al.* 1995), oceanographic features (e.g. Wing *et al.* 1998), and behavior (Kingsford *et al.* 2002). Direct observations of realized dispersal distances or estimates of dispersal from tagged larvae are difficult to obtain. For some groups such as rockfishes (*Sebastes spp.*), species level identification of larvae is not always possible. Genetic measures allow indirect estimation of long-term trends in larval dispersal and allow insights into historical or recent demographic events.

Purpose of Activity: To examine the genetic structure in grass rockfish populations as a means of inferring patterns of their larval dispersal along the California-Oregon coast of the United States, and consider implications for fisheries management.



Description of accomplishment and significant results:

Tissue samples of grass rockfish (*Sebastes rastrelliger*) were collected between 1996 and 2001 from 405 adult fish at eight sites (42.70°N, 124.50°W to 32.67°N, 117.25°W) spanning the species' range (Fig 1). Individuals were surveyed for polymorphism at six microsatellite loci. Allele frequency heterogeneity was not significant among all sites ($F_{ST} = 0.001$; $p = 0.18$), nor in pairwise comparisons, but a clear correlation of genetic and geographic distance was detected ($p = 0.019$). Fit of genetic and geographic distance was stronger within biogeographic provinces than at a range-wide scale, suggesting that populations north and south of the Point Conception biogeographic boundary are not in equilibrium with respect to migration and genetic drift. Estimates of mean coastal dispersal distances

Figure 1. *Sebastes rastrelliger*. Sampling sites overlaid on map depicting sea surface temperatures for April, 2000. Oregonian biogeographic province ends at Point Conception (near Vandenberg) and the Californian biogeographic province extends to the south.

associated with the isolation by

distance relationship are on the order of 10 km generation⁻¹. Such limited dispersal in a species with a pelagic early life history suggests active retention mechanisms within the near shore.

Significance of accomplishment: Grass rockfish have a much more limited dispersal than expected for a species with a pelagic early life history, which has important implications for coastal management zones and the design of marine reserves.

Problems: None.

Contact: Russ Vetter, (858) 546-7125